

ENVIRONMENTAL VII PLANNING AND CONSERVATION

Why is Environmental Planning and Conservation Important?

The abundance of natural resources was instrumental in the early settlement of Flagstaff, and the availability of water, timber, and forage helped provide the basis for the town's economy. Over time, the economy's dependence on natural resources has shifted from natural resources extraction to natural resource-based tourism. In fact, tourism, recreation, and quality of life based on the natural environment have become more important to the Flagstaff area's economy than logging. The natural environment, however, remains the critical foundation on which the region's economy, character, and quality of life rely.

Underlying the *Flagstaff Regional Plan*, therefore, is the basic principle that a healthy natural environment is necessary for a healthy and prosperous human community and economy, so future development will be sensitive to this principle. This section of the plan addresses air quality, climate, dark skies, ecosystem health, environmentally sensitive lands, natural quiet, noxious and invasive weeds, soils, and wildlife in the context of natural systems worthy of conservation and protection.

The protection of the natural environment is a common thread running through virtually all of the *Flagstaff Regional Plan*, including the plan's overall vision, which prominently features stewardship of the region's ecological setting and the future vitality of its natural environment. The long-term health and viability of our natural landscapes is essential to achieving the future envisioned by this plan.

GUIDING PRINCIPLES

Sustainability matters.

Environmental, economic, cultural, and social sustainability ensure that present actions are the basis for future health and prosperity.

The environment matters.

Natural environmental health is inherent to individual and community health, and healthy ecosystems should be nurtured.

A smart and connected community matters. Smart land use and design based on cohesive communities are respectful of our environment and create efficiencies that benefit community health, social interaction, commerce, and infrastructure.

Place matters. Regional growth should occur in harmony with the community's historical character, unique cultural resources, and natural environment.

Cooperation matters.

Regional partnerships create a strong community, protect the environment, and achieve our common goals.



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Air Quality

The excellent air quality found within the Flagstaff region not only benefits the community with clean air to breathe, but also with a thriving, healthy ecological environment, as well as a popular tourist attraction. Therefore, effective land use planning and proactive measures are critical to maintaining our air quality in the future. New development and industry should be planned so that it does not create a violation of the National Ambient Air Quality Standards set by the U.S. Environmental Protection Agency (EPA).

During the past decade, the Flagstaff region realized growth that increased air pollution-generating activities, such as on- and off- road vehicle emissions; rail traffic; residential, commercial, and industrial development; and wood-burning fireplaces.

In addition to growth impacts, upwind stationary sources such as electrical power plants, mining operations, and other industries emit air pollutants that may affect our region. More than a dozen facilities operate within or adjacent to Coconino County that produce significant amounts of carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOC), sulfur dioxide (SO2), particulate matter (PM10 and PM2.5), or ammonia (NH3).

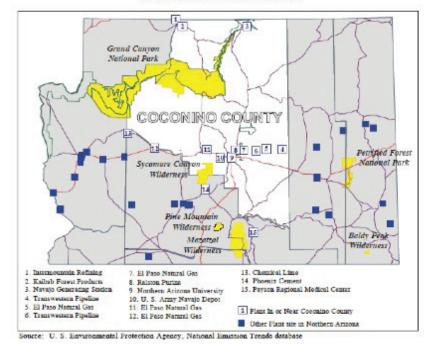


FIGURE 1. LOCATIONS OF INDUSTRIES EMITTING CO, NOX, VOC, SO₂, PM₁₀, PM₂₋₈, OR NE IN OR NEAR COCONINO COUNTY

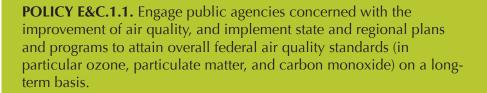
Violations of National Ambient Air Quality Standards have not occurred in Coconino County. However, on some days, regional haze causes perceptible reductions in visibility.

Beginning in August 2011, stricter EPA standards were put into effect, with the potential impact that Coconino County will be the responsible agency for any nonattainment air quality issues and may initiate restrictions and limitations (e.g., reduction or elimination of burn permits and, potentially, vehicle emissions testing.). Over the years, however, city and county policy-makers have realized the benefits of a clean-air environment and have been proactive to minimize potential impacts with regulation and the goal to attract non-polluting industry to the region. The following goals and policies continue build upon these efforts and direction.

GOALS AND POLICIES - AIR QUALITY

Goal E&C.1.

Proactively improve and maintain the region's air quality.



POLICY E&C.1.2. Pursue reduction of total emissions of high-priority pollutants from commercial and industrial sources and area-wide smoke emissions.

POLICY E&C.1.3. Improve air quality by reducing vehicular emissions.

POLICY E&C.1.4. Encourage strategies and partnerships to mitigate

POLICY E&C.1.5. Maintain air quality through pursuit of nonpolluting industry and commercial enterprises.

POLICY E&C.1.6. Seek feasible alternatives to reduce the smoke produced through prescribed burns and slash piles while continuing efforts to return fire to its natural role in the ecosystem.



Climate Change and Adaptation

Warming of the climate system is undeniable, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Intergovernmental Panel on Climate Change 2007). At the same time, weather patterns have become more extreme, with more intense and longer droughts, more extreme precipitation events, and increased heat waves.

The impacts of decreased precipitation (drought) and warmer summers will result in drastic changes to our vegetation and animal communities, as well as declines in agricultural productivity and food security. Temperature increases also put great strain on the infrastructure of water management, energy supply, transportation, public health, communications, housing, and national security, as well as insurance and emergency preparedness. This in turn greatly affects a community's economic vitality and emergency response.

"Start Hoarding your Beans"

According to a study from the Royal Botanic Gardens in the U.K. and the Environment Coffee Forest Forum in Ethiopia, up to 70 percent of the world's coffee supply could be gone by 2080 due to climate change. This is just one example of how climate change could affect our daily lives in a drastic way.

Read more at: http://blogs. smithsonianmag.com/ food/2012/12/start-hoardingyour-beans-thanks-to-climatechange-7-coffee-may-be-thenorm/#ixzz2leJWw3lO

CLIMATE CHANGE IMPACTS IN THE FLAGSTAFF REGION

Recent warming in the Southwest has been among the most rapid in the nation. This is driving declines in spring snowpack and Colorado River flow. Key issues that the American Southwest, including the Flagstaff region, must address include the following:

- Increasingly scarce water supplies
- Reduction in annual snowpack and decrease in snowmelt
- Depleted soil moisture
- Increasing temperature, drought, wildfire, tree mortality, and invasive species that will accelerate transformation of the landscape
- Increased frequency and altered timing of flooding
- Adverse impacts on the region's unique tourism and recreation opportunities
- Increasing risks to cities and agriculture from a changing climate
- Increased vulnerabilities of the community's lower income, poor, and elderly
- Particular vulnerabilities of Native Americans to projected changes in climate, as the communities are closely tied to specific reservation boundaries that restrict relocation abilities, limiting opportunities to cope with a change in water resources, agriculture, and ecosystems

CLIMATE ADAPTATION AND MITIGATION – BUILDING RESILIENCY AND REDUCING RISK

Actions taken today can contribute to a safer, more resilient and adaptable community in the future. Adaptation to climate change means preparing for potentially drier, hotter, and more extreme weather conditions. Climate mitigation efforts can reduce the severity of climate change, but they cannot completely prevent it from happening. As a result, not only must greenhouse gas emissions be curbed, but we must increase the region's climate resilience, which is our ability to withstand and recover from extreme events and climate changes. Both adaptation and mitigation strategies are needed, at the community and personal level.

The region has always faced climate risks, including forest fires, record warming, snow storms, high winds, flooding, and drought. These events affect every resident, and as the regional climate changes, these risks will become more frequent and severe. For instance, the 2009 Shultz Pass Wildfire destroyed 15,870 acres of National Forest, and the subsequent Shultz Pass flood of 2010 caused millions of dollars in damages to homes, property, and roads. The effects of this extreme event could have been lessened with preventative measures.

The Flagstaff region has the opportunity to help mitigate the changes in climate, and simultaneously be ready for its effects by understanding the potential of wildfire, flooding, drought, and other effects of climate change and then preparing for such hazards. Individual preparation measures could include preparing our homes for potential fire, implementing stormwater management best practices, and becoming more water efficient. There are also many personal choices community members can make that will reduce greenhouse gas emissions and help better prepare people for the impacts of climate change. Personal home or business investments in water conservation and stormwater collection, energy efficiencies, walking, biking, bus-riding, recycling, re-using, and sharing all contribute to mitigating climate change.

At the community level, investing in critical public infrastructure such as reclaimed water, conservation, and stormwater collection; efficient use of energy resources; self-reliance on transportation options; food production and the ability to generate energy by means other than fossil fuels; and protecting and preparing the community for extreme weather events, flooding, wildfires, and other natural and humancaused hazards are examples of large-scale preparation (refer to the *City of Flagstaff Resiliency and Preparedness Study* 2012).

For the purposes of the *Flagstaff Regional Plan*, how we develop land and transition to compact development and walkable communities will have the biggest impact on our reduction of greenhouse gas emissions and mitigating climate change through local action.

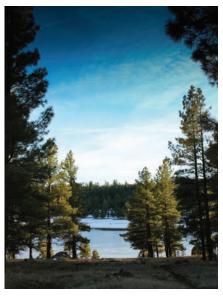


Photo by: XXXXXX XXXXXX

GOALS AND POLICIES - CLIMATE CHANGE AND ADAPTATION



An effective response to climate change must combine mitigation—to avoid the unmanageable—with adaptation, to manage the unavoidable.

Goal E&C.2.

Reduce greenhouse gas emissions.

POLICY E&C.2.1. Reduce fossil-fuel generated energy consumption in public, commercial, industrial, and residential sectors.

POLICY E&C.2.2. Promote investments that strengthen climate resilience and discourage those that heighten climate vulnerability.



Photo by: XXXXXX XXXXXX

Goal E&C.3. Strengthen community and natural environment resiliency through climate adaptation efforts.

POLICY E&C.3.1. Develop and implement a comprehensive and proactive approach to prepare the community for and to minimize the impacts of climate change induced hazards.

POLICY E&C.3.2. Review and revise existing regulations, standards, and plans (codes, ordinances, etc.) to reduce the community's vulnerability to climate change impacts.

POLICY E&C.3.3. Invest in forest health and watershed protection measures.

POLICY E&C.3.4. Increase the region's preparedness for extreme climate events.

Goal E&C.4. Integrate the best available science into all policies governing the use and conservation of Flagstaff's natural resources.

POLICY E&C.4.1. Assess vulnerabilities and risks of Flagstaff's natural resources.

POLICY E&C.4.2. Develop water use policies that attempt to integrate current best projections of climate change effects on the Colorado Plateau's water resources, emphasize conservation and rainwater harvesting, and minimize the energy-intensive transport and pumping of water.

Dark Skies

Flagstaff has become one of the few deep space research sites in the world, and is home to the Lowell Observatory, U.S. Naval Observatory's Flagstaff Station, National Undergraduate Observatory, and Navy Prototype Optical Interferometer. In July 2012, the Discovery Channel Telescope was commissioned as Lowell Observatory's flagship research telescope, the fifth largest telescope in the continental United States and one of the most technologically advanced. With this cutting-edge telescope, and with Discovery Channel as a partner, Lowell Observatory will continue to contribute substantially to tourism in the area.

Our success in observatory and planetary sciences is attributed to the region's vanguard approach to protecting dark skies with the passing of Ordinance 400 in 1958 that banned advertising search lights that threatened the night sky. In 1989, the City of Flagstaff and Coconino County strengthened their commitment to dark skies and the planetary industry by passing land development codes that restricted the amount of light per acre in outdoor lighting installations as well as establishing light district codes and standards. On October 24, 2001 the City of Flagstaff was recognized as the first International Dark Sky City for its pioneering work in the development and implementation of lighting codes that balance the need for preserving Flagstaff's dark sky resources with the need for safe lighting practices.

To remain one of the premier astronomical sites in the world and to be astronomically productive, the region must control artificial light and air pollution while recognizing the need for outdoor lighting for a safe environment in urban centers. This will require not only the continued enforcement and improvement of local, modern lighting codes as lighting technologies emerge and evolve, but as development begins to spread into the areas near the observatories.





Photos by: Shabo Zhang

GOALS AND POLICIES - DARK SKIES

Goal E&C.5. Preserve dark skies as a natural resource and as an important economic benefit and element of community character.



POLICY E&C.5.2. Prevent light trespass.



Ecosystem Health

The Flagstaff region has a proud tradition of collaborative resource management that recognizes both the intrinsic value of our ecosystems and their importance to our water supply, tourism, agriculture, and more. Our ponderosa pine forest crosses all ownership and management boundaries including private lands, Coconino National Forest, Walnut Canyon and Sunset Crater National Monuments, State Trust lands, and Camp Navajo. At the same time, the forest and other ecosystems in the planning area represent a biologically interconnected landscape. Ecosystem health is central to our community vitality and land use and management decisions should thus be approached collaboratively and holistically.



Photo by: XXXXXX XXXXXX

Our forests are the source of our water and a critical aspect of our overall water infrastructure, no less important than wells, reservoirs, and water treatment facilities. Declines in forest health may lead to unnatural high-intensity wildfires and devastating post-fire flooding that pose serious risks to our water supply and infrastructure. Repair and recovery efforts associated with post-fire flooding events and other associated damage now far exceed, on a national average, the suppression cost of the fire itself and may extend for years. In recognition of this threat the City of Flagstaff passed a \$10 million "Forest Health and Water Supply Protection Project" bond in November 2012, the first of its kind in the United States. This effort will fund planning and forest treatments on nearly 11,000 acres of federal and state lands within two watersheds critical to the city. Reducing destructive fire potential in these areas will prevent inevitable post-fire flooding into the community (Rio de Flag/Dry Lake Hills watershed) and protect storage capacity and water quality of the Lake Mary reservoir (Lake Mary watershed). Together with ongoing efforts such as the Greater Flagstaff Forests Partnership and Four Forests Restoration Initiative, this work will pay great dividends in ensuring healthy forests and the protection of our water system.

Collaborative efforts are also improving the health of other regional ecosystems. Many of our grasslands, such as Forest Service areas on Anderson Mesa and private ranchlands around the San Francisco Peaks, have been altered by grazing, invasive weeds, shrub encroachment, and climatic changes. Restoration efforts by private landowners and public agencies have improved grassland conditions through shrub and weed removal and the return of native plants. Similar projects to restore pinyon-juniper woodlands may help return these habitats to a more natural fire regime and species composition, and improve the diversity of understory forbs and grasses to provide more desirable forage for wildlife. The Flagstaff area boasts a number of largely ephemeral wetlands including Rogers Lake, Dry Lake, lakes and ponds on Anderson Mesa, and spring-fed wet meadows such as Pumphouse Meadow in Kachina Village. These rare and sensitive habitats provide valuable resources for wildlife, recreation, flood control, aquifer recharge, and other functions. Greater Flagstaff also features riparian areas with primarily intermittent flows and values similar to our wetlands such as the Rio de Flag, Walnut Creek, and Pumphouse Wash. Many of these areas could benefit from active restoration. The successful multi-stakeholder effort to acquire and restore Picture Canyon on the Rio de Flag can serve as a model for further collaborative conservation efforts along the Rio and other watercourses in the planning area.

Invasive and noxious weeds pose an increasing economic and ecological threat throughout the West, and the Flagstaff region is no exception. Invasive weeds have increased costs for landscape and maintenance along roads, school yards, parks, and other areas. Forest and grazing lands have been degraded, and unchecked infestations threaten greater losses. Such plants tend to spread rapidly, out-compete and displace native species, and disrupt ecosystem processes. If not controlled, invasive non-native plants reduce biodiversity, degrade wildlife habitat and jeopardize endangered species.



Photo by: XXXXXX XXXXXX

GOALS AND POLICIES - ECOSYSTEM HEALTH



Goal E&C.6. Protect, restore and improve ecosystem health and maintain native plant and animal community diversity across all land ownerships in the Flagstaff region.

POLICY E&C.6.1. Encourage public awareness that the region's ponderosa pine forest is a fire-dependent ecosystem and strive to restore more natural and sustainable forest composition, structure, and processes.

POLICY E&C.6.2. Encourage all landowners and land management agencies to emphasize forest ecosystem restoration and catastrophic fire risk reduction for the lands under their respective jurisdictions.

POLICY E&C.6.3. Promote protection, conservation, and ecological restoration of the region's diverse ecosystem types and associated animals, especially rare, sensitive, threatened and endangered species on both public and private lands in a landscape context.

POLICY E&C.6.4. Support collaborative efforts to return local native vegetation, channel structure and, where possible and applicable, preservation and restoration of in-stream flows.

POLICY E&C.6.5. Preserve Flagstaff's wetland areas and discourage inappropriate development that may adversely affect them and the ecosystem services they provide.

POLICY E&C.6.6. Support cooperative efforts for forest health initiatives or practices, such as the Four Forest Restoration Initiative (4FRI), to ensure healthy forests and protect our water system.

POLICY E&C.6.7. Use best environmental practices to control populations of exotic terrestrial and aquatic exotic and invasive plants and animals, eradicate where possible, and prevent new infestations.

POLICY E&C.6.8. The City and County Parks and Recreation Departments will pursue opportunities with other agencies and volunteer groups to control the spread of non-native invasive plants and noxious weeds on public park lands and natural areas.

POLICY E&C.6.9. Disturbed areas for improvements and landscaping for new developments shall emphasize the use of native, drought-tolerant or edible species appropriate to the area.

POLICY E&C.6.10. Limit use of herbicides, insecticides and similar materials.

Environmentally Sensitive Lands

Environmentally sensitive lands in the Flagstaff region include floodplains, riparian areas, wetlands, seeps and springs, and steep slopes. These areas contain critical resources and require special consideration in the development design and review process. Floodplains, riparian areas, and wetlands not only provide for the discharge of floodwaters and the recharge of aquifers, but also provide important habitat for plants and animals, wildlife movement corridors, and seasonal habitat for numerous bird species. Water courses of all types act as magnets for human settlement, recreation, and other activities. Seeps and springs provide essential water sources for natural ecosystems, as well as human communities. Steep slopes and ridgelines can be environmentally sensitive in the sense that they often have unstable, highly erodible soils; contain a wide range of vegetation types; and provide habitat for a diversity of bird and wildlife species. At the same time, prominent slopes and ridgelines can be attractive to property owners as building sites with spectacular views. Considering the rarity of these types of environmentally sensitive lands and their high environmental values, it is important to ensure a balance between environmental and human needs when development decisions may encroach upon such areas.

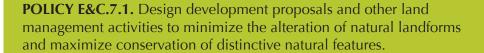


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GOALS AND POLICIES - ENVIRONMENTALLY SENSITIVE LANDS

Goal E&C.7.

Preserve and enhance the natural qualities of environmentally sensitive lands.



POLICY E&C.7.2. Favor the use of all available mechanisms at the City and County level for the preservation of environmentally sensitive lands, including but not limited to public acquisition, conservation easements, transfer of development rights, or clustered development with open space designations.



Natural Quiet

Just footsteps from Flagstaff's urban core, one leaves the commotion of the city and can simply walk into forested serenity or vast open spaces. This convenient and quick access to nature is one of the many reasons people live and visit Flagstaff. As development occurs on the urban fringe and visitor and recreation traffic increases, maintaining natural quiet, that is, the absence of human-generated sound becomes difficult. Future development should address noise issues through land use and site planning that appropriately locates intensive land uses, and includes buffers between uses and highway corridors.



Photo by: XXXXXX XXXXXX



GOALS AND POLICIES - NATURAL QUIET

Goal E&C.8: Maintain areas of natural quiet and reduce noise pollution.

POLICY E&C.8.1. Establish location-appropriate sound management tools with measurable criteria.

POLICY E&C.8.2. Evaluate land uses and transportation proposals for their potential noise impacts.

Soils

The geology of Coconino County has directly affected the formation of various soils due, in part, to the composition of bedrock materials, topography, geologic structures, and the influence of topography on climatic patterns. Soils in the area vary widely in type and character, ranging in composition from coarse-grained, well-drained materials to expansive fine-grained soils. Site development requirements differ accordingly.

Soils with high expansive potential can heave if the water content of the soil increases. Typical moisture sources that initiate this type of movement are rainfall, snowmelt, and excess landscape watering. This movement can result in drywall cracking, warped windows and doors, and eventually structural distress. Water leaks from utilities can cause extreme damage in these types of soils. Conventional shallow spread footings and slabs-on-grade are often not suitable for use on expansive soil sites. More specialized foundation systems or site preparation procedures could be required. Post-tensioned slab-on-ground or drilled pier and grade beam foundation systems are some of the typical solutions. Other possible site preparation treatments for this type of condition include removal of the clay soils and replacement with low expansive engineered fill material, or lime stabilization of the site soils.

Other considerations include areas with collapsible soils and areas of high groundwater. High groundwater can create substantial limitations for conventional septic systems. The areas with limitations are generally dispersed throughout the planning area. A site-specific geotechnical evaluation is required to identify limitations and provide detailed design parameters.



Photo by: XXXXXX XXXXXX

GOALS AND POLICIES - SOILS

Goal E&C.9. Protect soils through conservation practices.

POLICY E&C.9.1. County Policy: In areas of shallow or poor soils where standard on-site wastewater systems are not feasible, give preference to very low-density development, integrated conservation design, a centralized treatment facility, and technologically advanced environmentally sensitive systems.

POLICY E&C.9.2. Ensure that construction projects employ strategies to minimize disturbed area, soil compaction, soil erosion, and destruction of vegetation.

POLICY E&C.9.3. Follow best management practices when using prescribed burns in order to conserve soil resources.



Wildlife

Greater Flagstaff boasts an abundance of wildlife that is highly valued by residents and visitors alike. Wildlife-based recreation ranging from bird-watching to hunting draws visitors from around the state and contributes directly to the region's economy. Our community strongly supports the stewardship of wildlife and their habitats. Proactive planning and land management will help to ensure that as Flagstaff grows we continue to enjoy healthy populations of native wildlife, by maintaining the habitats and movement corridors on which they depend.

Our forest, grassland, wetland, and other ecosystems support diverse wildlife species and most use multiple habitats during the day and/ or year to support their activities. Breeding songbirds often forage in areas different from where they nest, while bald eagles and elk migrate seasonally over considerable distances to secure food and other resources. It is also important to conserve localized habitats needed by smaller, less-mobile species such as amphibians (wetlands and riparian areas), reptiles (basalt outcrops), and small mammals (prairies and forest meadows). These species often provide prey for larger animals and may have difficulty finding suitable areas if their current habitat is lost. Maintaining habitat connectivity through conservation of wildlife linkages or "corridors" is also critical to the long-term stability of wildlife populations. These movement areas may be relatively broad, or limited to narrower corridor-like features such as forested ridges, canyons, and riparian zones. Effective wildlife conservation thus requires considering the potential effects of land use decisions in their broader landscape context.

Natural and human-caused landscape modifications including drought, altered fire frequency, introduction of non-native plants and animals, and development may degrade or reduce habitat for wildlife. However, keeping wildlife in mind during planning and land use decisions, be it the design of subdivisions, siting of transportation corridors and trails, or development of renewable energy facilities, can help avoid or minimize negative impacts. Moreover, proactive conservation of sensitive and declining species in the near-term may prevent their listing as threatened or endangered in the future and help avoid the land use restrictions which listing entails. Ensuring stable populations of native wildlife also has broader benefits. Wildlife perform key ecological functions such as pollination, control of pest and disease organisms, seed dispersal, and many others that collectively help to maintain the integrity of our local ecosystems and the "ecosystem services" they provide. Conservation initiatives that preserve the full spectrum of native wildlife and the habitats on which they depend, such as the Four Forests Restoration Initiative, will help to ensure that Flagstaff residents continue to receive these natural benefits for years to come.

Photo by: XXXXXX XXXXXX

The Arizona Game and Fish Department is proactive in developing and implementing the Arizona State Wildlife Action Plan (2005-2015), Coconino County Wildlife Linkages Report (2011) and Interagency Management Plan for Gunnison's Prairie Dogs. These plans were developed on the premise that the most effective way to conserve rare, declining, and common wildlife is to restore and conserve healthy areas to live. Consequently, the action plan focuses on habitat types and riparian systems. The wildlife corridors, habitat areas, and watchable wildlife sites, as established by the Arizona Game and Fish Department, is an important layer within the Flagstaff Regional Plan open space planning maps (refer to the Open Space chapter).

GOALS AND POLICIES - WILDLIFE

Goal E&C.10. Protect indigenous and diverse wildlife populations, localized and larger-scale wildlife habitats, ecosystem processes, and wildlife movement areas throughout the planning area.



POLICY E&C.10.1. Encourage local development to protect, conserve, and when possible enhance and restore wildlife habitat.

POLICY E&C.10.2. Protect, conserve, and when possible enhance and restore wildlife habitat on public land.

POLICY E&C.10.3. Protect sensitive and uncommon habitats such as ephemeral wetlands, riparian habitats, springs and seeps, rare plant communities, and open prairie ecosystems including the physical elements such as water sources and soil types on which they depend through open space acquisition efforts, avoiding these features in teh design of subdivisions and other development, etc.

POLICY E&C.10.4. Support the control and removal of terrestrial and aquatic exotic and invasive animals.

POLICY E&C.10.5. Support the development of watchable wildlife recreation opportunities.

POLICY E&C.10.6. Conserve and restore important wildlife corridors throughout the planning area to allow wildlife to find suitable habitat in the face of climate change by moving along vegetational and elevational gradients.